Global Precipitation Chemistry Program Measurements at Mauna Loa Observatory

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INTRODUCTION

The Global Precipitation Chemistry Program (GPCP) was initiated in 1979 to address questions regarding the composition of precipitation chemistry prior to the advent of fossil-fuel combustion and to study the influence of sulfur and nitrogen species transported over long distances on the remote troposphere. This program was funded by the NOAA Air Resources Laboratory and was conducted in collaboration with the University of Virginia Department of Environmental Sciences and Cary Arboretum, New York. Published reports summarize progress to date [e.g., *Galloway et al*., 1984,1992, 1994; *Keene et al.*, 1986.

METHODS

The GPCP has analyzed samples of precipitation collected at 14 land-based sites and during 12 oceanic cruises. Samples of precipitation were collected by event in scrupulously washed polyethylene containers. Immediately after collection, pH was measured, samples were treated with $CHCl_3$ to prevent biological activity, and aliquots were subsequently sent to the University of Virginia for analyses for all major organic and inorganic chemical constituents.

One of the stations of the GPCP was located at the Mauna Loa Observatory (MLO). Beginning in August of 1983, 305 event precipitation chemistry samples were collected through a cooperative venture involving CMDL MLO. The MLO data set was collected to provide complete event chemistry suitable for process-oriented studies on Hawaii. All samples were collected on an event basis using a wet-only sampling device and were discarded if they remained in the collector more than 24 hours following the cessation of precipitation. No attempt was made to collect small volume events or samples over weekends and holidays.

DISCUSSION

The high data quality coupled with complete major ion analysis and short measurement periods will allow us to address a number of questions regarding the chemical climatology of MLO. In particular, we will investigate sources for nitrogen at MLO through rigorous trajectory studies using the daily chemistry data and the ARL HY-SPLIT [*Draxler*, 1992] model. The effect of the volcano on SO_4^{-2} can be addressed with this data set. We will also assess volcanic contributions to H_2SO_4 acidity in precipitation at the site. This analysis will contribute substantially to the understanding of nitrogen and sulfur cycling in the remote marine troposphere.

The data set is currently being analyzed in conjunction with transport models and we anticipate publishing the results in a peer-reviewed journal article. Unfortunately, due to reductions in Air Resources Laboratory funding, collection and analysis of precipitation at MLO ceased in February 1994.

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